Noa Attali

Proposal for Cognitive Science Undergraduate Thesis

Effects of Training Cantonese Speakers in Phonological Production of English Plosives

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**Abstract**

We are investigating the Critical Period Hypothesis (CPH) of second language (L2) acquisition, which claims that L2 acquisition depends on the learner's age. CPH posits that biological predispositions provide younger speakers with an advantage over older speakers, such that younger learners acquire L2 with greater ease. Alternatively, an immersive L2 environment may matter more. In collaboration with Terry Au (ms), we hypothesize that amount of good L2 input can influence the timing factor in L2 acquisition. We propose to test this hypothesis by analyzing the effects of training versus age in L2 phonology. We are carrying out acoustic analysis using PRAAT software of production data from Cantonese speakers of differing ages intensively training their pronunciation of English words. Our analysis focuses on the speakers' production of English plosive stops /b, d, g/ and /p, t, k/ in phonological minimal pair words (i.e., *bag* and *back*) to test whether training improves a speaker's ability to produce the contrast between these plosives. As a future goal, we want to investigate the acoustic cues most important in helping speakers make these distinctions.

*Keywords*: critical period; second language acquisition; phonology; perceptual training

**Introduction**

Folk wisdom claims that younger speakers tend to acquire a second language (L2) with greater ease than older speakers. as in immigrant families where the parents in the long term speak more effort and with a stronger accent than the children. Does this phenomenon occur due to biological and maturational factors, or environmental factors? That is to say, does the brain lose flexibility with age such that late learners are biologically predisposed to attain lower levels of L2 proficiency than early learners, or do the environment and linguistic input, the individual’s first language (L1), as well as the individual’s motivation and subjective fit to the environment, play at least as important a role in final L2 proficiency?

**Evidence for Maturational Factors Affecting Language Acquisition**

The former possibility, is referred to as the Critical Period Hypothesis (CPH) . according as it has been interpreted, makes various assumptions and predictions (Pallier, 2007). In the strict tradition, Lenneberg (1967) suggests there is a limited time period between birth and puberty in within which language can be acquired, and beyond that point language acquisition and competency declines. Lenneberg (1967), utilizes indirect behavioral evidence to propose that beyond puberty, the brain irreversibly loses neural plasticity necessary for language acquisition. A variation on Lenneberg’s (1967) idea, is that a speaker’s L1 ‘fixes’ the functional neural connections in the cortex (Penfield, 1965; cited by Pallier, 2007). There is much empirical support for the notion of a critical period. For instance, Curtiss (1977), studied children with severe linguistic deprivation and argued that their inability to attain linguistic competence, despite rehabilitation, is evidence in support of CPH. Further, Newport and Supalla (1987), studied congenitally deaf adults, and argued that increasing age of exposure to ASL as L1 in childhood and puberty predicts a decline in ultimate (language?) production and comprehension. However, their study showed a gradual decline in proficiency rather than a sharp drop; thus this suggests a sensitive rather than a critical period for language acquisition.

Later researchers have investigated the existence of a sensitive period for second language acquisition. When it comes to age effects on L2 rather than L1 proficiency, researchers must contend with the possible effects of L2 on L1 and with the correlation between age and non-maturational factors. As reviewed by Johnson and Newport (1989), the literature suggests that in studies of immigrants, age of arrival to a host country is the only predictor of L2 proficiency; and that late learners have an initial and short-lived advantage over early learners which is reversed when measured by ultimate attainment.

Additionally, Johnson and Newport (1989), studied Chinese and Korean speakers that immigrated to America, and argued that their performance on tests of grammaticality judgments for English morphology and syntax is best predicted by their age of arrival that is to say, their immersion in L2. [relevant criticism] Oyama (1976) argues for a sensitive period in acquiring L2 phonology. [criticism]

(past tense?)

**Evidence for Nonmaturational Factors Affecting Language Acquisition**

The latter, environmental possibility points to the importance of an immersive environment for L2 acquisition. There exist differences in affective and sociological learning conditions for early and late learners, especially for immigrant populations. Children in school settings are more likely to receive an immersive environment with good and constant input from native speakers, whereas late learners are more likely to be less assimilated into a social environment with good input. Late learners may be further hindered by consciousness of social stigmas associated with foreign accents, which creates a feedback loop because self-conscious or unmotivated speakers will speak less in the second language.(you can cite Terry here)

Terry Au (ms) ----

**Study Hypothesis and Goals**

Purely biological explanations for L2 proficiency can be distinguished from potential environmental factors by examining the effects of training speakers on L2 input. For our purposes, CPH is taken here to mean that a sensitive period for L2 phonological acquisition exists, but that non-maturational factors are negligible. Consequently, training late learners in phonological perception and production should be less effective than training early learners. If quality and quantity of L2 input is an influential factor in L2 perception and production, then training late learners should be equally, and potentially more effective than training early learners. Effective training is considered to result in statistically significant improvements in perception and production of L2. In our study the improvements concern speakers’ abilities to produce the contrast between phonological minimal pair words.

In collaboration with Terry Au (ms), we hypothesize that

Cantonese and English phonology in contrast

Chan and Li (2000)

Predictions and assumptions for effect of L1 on L2

As a future goal, we want to identify and measure the acoustic cues most important in helping speakers make these distinctions.

**Methods**

**Participants**

-Terry Au

**Stimuli**

**Experimental Procedure**

**Planned Analyses**

**Acoustic Analysis**

-Acoustic analysis using Praat software

-I will be responsible for data from 11/1 year olds

-On data classified as onset, we will mark voice onset time (VOT) duration as the length of time between the release of the onset stop consonant and the onset of periodicity marking the vowel. If there is aspiration, we will measure the mean aspiration intensity. We will measure vowel duration using the .wav method to mark the start of the vowel and the F2 method to mark the end of the vowel. We will measure the F2 at the end of the vowel and the pitch (F0) of the vowel if there is a level pitch contour, or the change in pitch if there is not a level pitch contour. If there is a voicing bar, we will measure the duration.

-On data classified as coda --

**Statistical Analysis**

-We will conduct a series of ANOVAs

-Comparing between pretest and posttest within age group: improvement per age

-Comparing improvements across age groups: testing the CPH

-Comparing predictive power of measured acoustic cues

-Bayesian methods, with data collected from L1 English Rutgers students as priors

**Start/End Dates**

Work on the project begins on approximately May 16 (?) and will end around August 10 (?), 2018. //Additional analysis of the data used in this study and further collection of data will continue throughout the 2018/2019 academic year.

**Student Advisor Meeting Schedule**

I will consult with my advisor(s) at least once a week for the duration of the project.

**References**

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Johnson, J. S., & Newport, E. L. (1989). Critical period effects in second language learning: The influence of maturational state on the acquisition of English as a second language. *Cognitive psychology*, *21*(1), 60-99.

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The praat resources

Sonya Bird, Qian Wang, Sky Onosson, Allison Benner. (2015). *Acoustic Phonetics Lab Manual*. Department of Linguistics, University of Victoria. 1-82.

Rahul Balusu and Adamantios Gafos. (2010). *Praat User’s Guide: Measuring Duration and Formants.* 1-9.

Online praat resources

Appendix A. Terry Au’s Appendix A

Appendix B. Screenshot of Praat